CLAIMS

1. A method for producing a fluorocopolymer which comprises a polymerization reaction of a fluorine-containing ethylenic monomer with at least one fluorovinyl ether derivative represented by the follwoing general formula (I):

$$CF_2=CF-O-[CF_2CF(CF_3)O]_n-(CF_2)_m-A \qquad (I)$$

(wherein n represents an integer of 0 to 3, m represents an integer of 1 to 5, and A represents $-SO_2X$ or $-COOY$; X represents a halogen atom or $-NR^1R^2$; R^1 and R^2 are the same or different and each represents a hydrogen atom, an alkali metal, an alkyl group or a sulfonyl-containing group and Y represents a hydrogen atom or an alkyl group having 1 to 4 carbon atoms) to give a fluorocopolymer,

said fluorine-containing ethylenic monomer being a perhaloethylenic monomer represented by the following general formula (II):

$$CF_2=CF-R_f^1 \qquad (II)$$

(wherein R_f^1 represents a fluorine atom, a chlorine atom, R_f^2 or OR_f^2; R_f^2 represents a straight or branched perfluoroalkyl group having 1 to 9 carbon atoms, which may have an ether oxygen atom(s)) and/or a hydrogen-containing fluoroethylenic monomer represented by the following general formula (III):

$$CHX^1=CFX^2 \qquad (III)$$

(wherein X^1 represents a hydrogen atom or a fluorine atom and X^2 represents a hydrogen atom, a fluorine atom, a chlorine atom, R_f^3 or OR_f^3; R_f^3 represents a straight or branched perfluoroalkyl group having 1 to 9 carbon atoms, which may have an ether oxygen atom(s)) and

said polymerization reaction being carried out in a saturated perfluorohydrocarbon while additional feeding of said fluorine-containing ethylenic monomer and said fluorovinyl ether derivative being carried out.

2. The method for producing a fluorocopolymer according to Claim 1,

wherein the polymerization reaction brings a mass of the fluorocopolymer relative to a volume of a polymerization solution to arrive at 30 g/L or a higher level.

3. The method for producing a fluorocopolymer according to Claim 1 or 2,

wherein the saturated perfluorohydrocarbon has 20 or less than 20 carbon atoms and has a cyclic structure or linear structure each optionally with a branched structure.

4. The method for producing a fluorocopolymer according to Claim 1,

wherein the saturated perfluorohydrocarbon is a perfluorohexane or a perfluorocyclobutane.

5. The method for producing a fluorocopolymer according to Claim 1, 2, 3 or 4,

wherein the fluorine-containing ethylenic monomer is $CF_2=CF_2$, n is 0 (zero), m is 2 and A is $-SO_2F$.

6. A fluorocopolymer produced by the method for producing a fluorocopolymer according to Claim 1, 2, 3, 4 or 5.

7. The fluorocopolymer according to Claim 6 which satisfies the following relations (a) and (b):

$0 \leq \Delta H \leq 6.375 - 0.475C \quad (5 \leq C \leq 13)$ (a)

$0 \leq \Delta H \leq 0.2 \quad (13 < C \leq 18)$ (b)

where ΔH is a heat of fusion (in J/g) as appearing at 315 to 325°C upon measurement with a differential scanning calorimeter and C is a fluorovinyl ether derivative unit content (in mole percent) in the fluorocopolymer.

8. A molded article formed from the fluorocopolymer

according to Claim 6 or 7.

9. The molded article according to Claim 8, which forms a membrane.

10. A solid polyelectrolyte fuel cell comprising the molded article according to Claim 8 or 9.